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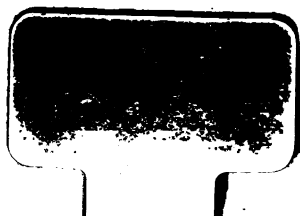
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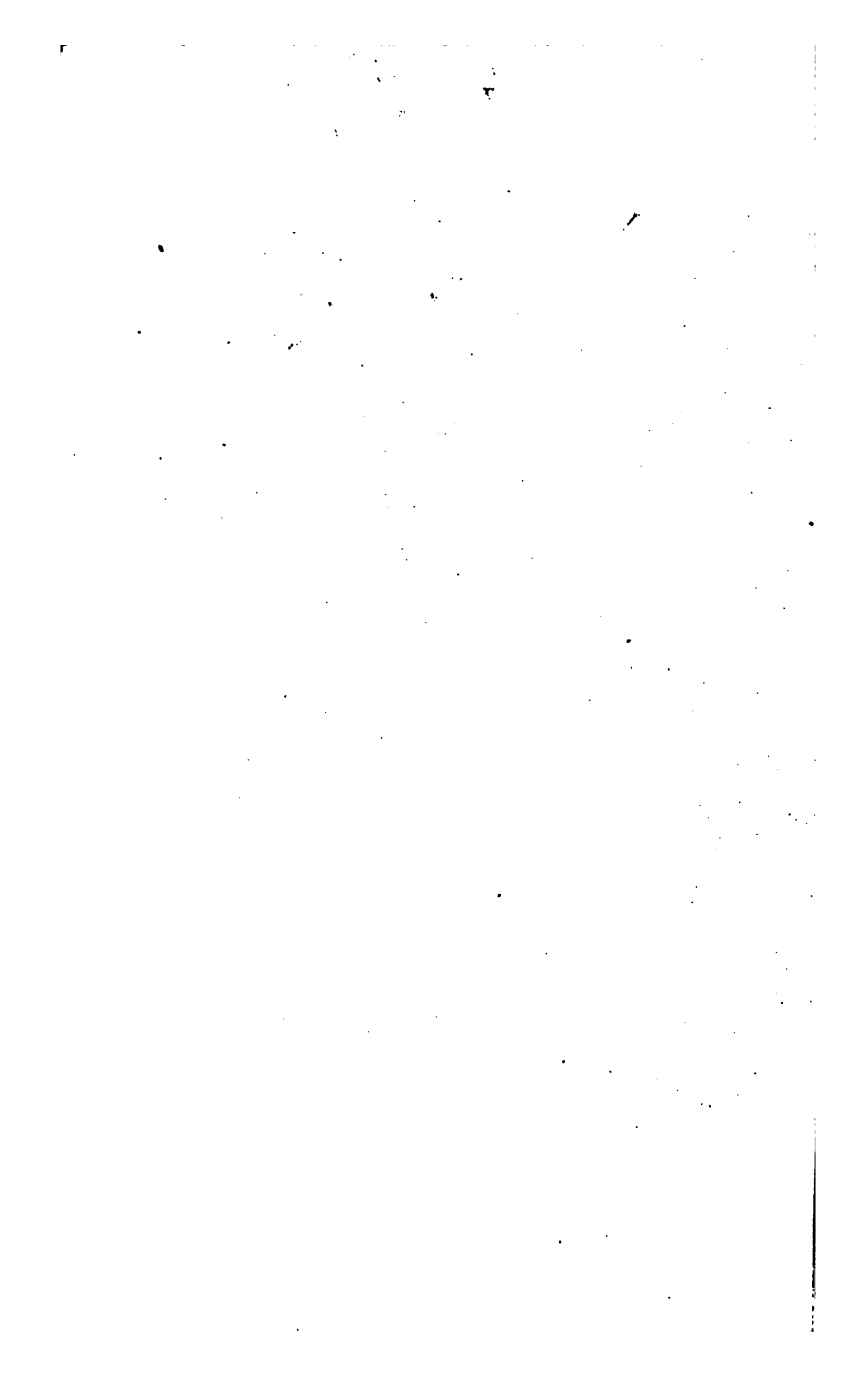
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THE  
SHILLING BEE BOOK.



BY  
**ROBERT GOLDING,**  
HUNTON, KENT.

LONDON.  
LONGMAN, BROWN, AND CO  
MDCCCXLVIII.



THE  
SHILLING BEE BOOK,  
CONTAINING THE LEADING FACTS  
IN THE  
NATURAL HISTORY OF BEES,  
WITH DIRECTIONS FOR  
BEE MANAGEMENT.

By ROBERT GOLDING,  
HUNTON, KENT.

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SECOND EDITION.

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"So work the Honey Bees—  
Creatures that by a ruling nature teach  
The art of order to a peopled kingdom."

*Shakspeare.*

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LONDON:  
LONGMAN AND CO., PATERNOSTER ROW.  
1848.

[ENTERED AT STATIONERS' HALL.]





## ADVERTISEMENT TO THE SECOND EDITION.

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The fact of the first Edition of this little work being out of print within three months of its first announcement, is at once conclusive as to the *want* of such a work, and highly gratifying to the author; who has, in this Edition, added much new matter, and revised the old, so as to make the work still more acceptable and useful, to all who keep bees, or who feel pleasure in studying their interesting habits.

*Hunton, near Maidstone, Jan., 1848.*



## PREFACE.

Having been repeatedly importuned to publish the result of my experience in the management of bees, and it having been suggested that if I could so concentrate my observations as to bring them within the means of the poorer bee-keepers, a great benefit would be conferred upon them,—the price of most of our apiarian works placing them beyond their reach,—I have endeavoured, at the risk of a brevity amounting perhaps to paucity, so to condense the information I wished to convey, as to fill up a desideratum in apiarian literature—a **SHILLING BEE BOOK**, and thus add to the poor man's scantily-furnished book-shelf a work which it is hoped will prove cheap, pleasing, and useful.

All that I have been able to attempt, is to give evidence on a few leading and most important points in the natural history of the bee, from my own experience; and also such practical information as will enable every lover of investigation in natural history, either to satisfy himself of the truth of these points, by the same means as I have adopted, or to apply them to rendering bee management agreeable and profitable in the highest possible degree.

Whilst, however, it has been one of my objects to enable the humblest bee-keeper to derive

increased pleasure and profit from his care of that interesting insect,—at the same time I have given, for the assistance of those who may have more leisure and greater means, reference to other authorities, whence they may learn the fullest knowledge of the progress of discovery and invention on the subject, from the earliest period. Trusting to the candour of all persons for excusing any inadvertent omissions or errors of style and language, it will give me great pleasure to find that my practical suggestions may prove of advantage.

R. GOLDING.

## NATURAL HISTORY OF THE HONEY BEE.

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Whilst it is certain that the produce of the Bee was greatly in favour with the early inhabitants of all countries where it was known, it is also pretty evident that the study of its natural history and curious architecture was matter of contemplation to inquiring minds in remote times. The philosopher Aristotle, the celebrated Roman agriculturist Columella (see his treatise *De Re Rustica*), the great poet Virgil, all alike employed their pens in recording the wonders of our little architect.

A work on the Bee, to be useful, should be a compendium of the most valuable matter which can be gleaned from the best authorities, combined with the results of practical experience. Among these authorities stands pre-eminent "The Honey Bee," by Dr. Bevan (Van Voorst, London, 1838,) which, to use the words of the *Quarterly Review*, is "the standard work" upon the subject. The writer of the present work having lent his humble assistance in the preparation of that work, feels alike at liberty to recommend its study to his apiarian brethren, or to

draw from its pages the valuable information which they can supply, containing as they do many particulars of the highest interest, which are necessarily omitted in a work of this character.

The Bee is considered by naturalists as belonging to what are called perfect societies of insects, and in entomological arrangement is placed in the order *Hymenoptera*, genus *Apis*.

Every association or swarm of bees comprises three descriptions of individuals.

The QUEEN,—at once the mother and the mistress of the hive. She is distinguishable from the rest of the society by the great length of her body, and the proportional shortness of her wings.

The WORKING BEES,—or undeveloped females, who are consequently *non-breeders*. In a single hive the number of these varies from 10,000 to 20,000. Upon this class devolves the labour of the whole community; they rear the young, collect and store the provision, and build the cells in which it is warehoused, and which contain the brood.

The DRONES, or MALES.—These generally make their appearance about the end of April, and remain only during the summer months, being expelled when it is certain that they are no longer required. They are, however, allowed to remain in a queenless stock, it may be assumed in a kind of forlorn hope that their services may be required. They are larger than the workers, *without stings*, and of a darker colour.

It is the office of the queen bee to multiply the species by depositing eggs in the waxen cells.

These cells vary in size, according as they are intended for the rearing of drones or of workers. The royal cells, those intended for the rearing of queens, vary in a remarkable degree from the others, both in shape and direction. They hang perpendicularly, and somewhat approach to an inverted acorn and cup in shape, and are much more massive in structure. In these the eggs are deposited which are destined to become queens, and a stock, at the swarming season, generally contains from 3 to 6, or sometimes even 9 or more of these cells. The working bee comes forth a perfect insect, in about twenty-one days after the egg is deposited; the queen in about sixteen days; and the drone in about twenty-four days. These periods probably vary with the state of the external temperature.

Bees, when deprived of their queen, have the power of selecting one or more worker-eggs, or grubs, and converting them into queeess, thus showing that there is no inherent difference in female ova. To effect this, each of the selected grubs has a royal cell formed for it. Schirach, who was secretary to the Apiarian Society in Upper Lusatia, may be regarded as the discoverer, or rather the promulgator, of this fact, for there seems pretty good evidence of its having been long known, particularly in the Levant;\* Schirach's experiments have been frequently repeated and amply confirmed by Huber, Bonner, Dunbar, Bevan, myself, and others. Few questions in natural history have created more controversy amongst naturalists than this power of

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\* See Wheeler's Travels, London, 1682.

the bees to make a perfect queen; and although it has now become as well established as any fact can be, there are yet many who doubt, and some who absolutely deny, the power. These latter persons seem to have a vague notion about there being common eggs and royal eggs. *There is no such distinction.* Any common worker-egg is capable of producing a queen. For the satisfaction of the apiarian inquirer, I will extract from my journal my first experiments upon this subject.

"On the 22nd of May, 1833, I introduced into the unicomb hive (hereafter to be described) a second swarm, which of course contained a young queen. On the 29th I saw the young queen leave the hive, and after she had been absent thirteen minutes, returned with what was probably, according to Huber's opinion, the evidence of fecundation, and on the following day I saw her depositing eggs in the cells. On the 6th June, at 9 o'clock, I took away the queen. The bees did not appear to miss her until the next morning, when it was evident, from their agitation, that they had ascertained their loss. Some ran wildly about the hive, whilst others went flying and searching for her in its neighbourhood. This, however, did not continue long, for between 12 and 1 o'clock they had begun to construct three royal cells, the bees busily employed upon which frequently introducing their heads into them. On the 10th, two royal cells were finished and were sealed up, and the preparation of the other was discontinued. During the night of the 17th, one queen came forth, and was probably permitted to make off with her rival, for in the morning I



found the other cell torn open at its side, and its contents gone. On the 3rd July the young queen began to lay eggs. On the 12th July I also removed this second queen from the hive. On the 14th three royal cells were begun as before. On the morning of the 26th one queen came forth, and at 11 o'clock the workers were assisting another young queen to get out by tearing away the cell. At 12 o'clock this young queen came out, and there were thus two queens at liberty in the hive at the same time. My brother apiarians will readily believe how anxiously I watched for the combat between the two queens, as described by Huber. Both queens ran over the comb, as if searching for something, and after having passed each other very closely two or three times, at length they recognized each other. The elder clasped the younger round, over the back, and soon gave her the fatal sting, and left her. Though the wounded queen drooped and began to fall, yet she soon afterwards somewhat recovered and walked about the hive. The other occasionally visited her, but did not repeat her attacks, as if knowing it to be unnecessary. The next morning the wounded queen was brought out of the hive, still alive, and lived until near noon. Consequently, the sting, though inflicting a vital injury, is not immediately fatal. The young queen from the third cell was killed, and brought out, soon after the second queen. I heard the victorious young queen utter the long, plaintive note of piping. Huber, having never heard queens, thus reared, *pipe*, erroneously assumes that they are mute. Dr. Dunbar, a Scottish apiarian, has, like myself, heard them pipe."

I have made these rather long extracts, trusting that there is enough internal evidence about them to convince the most sceptical. The Rev. Jarvis Kenrick, at that time Curate of Hunton, and now of Horsham, at my invitation, anxiously watched the whole process, after assisting me in taking away the first queen. This being an unusually interesting point, I will add an instance of the *practical* utility of this power of developing fecundity in worker-brood, in another extract from my journal:—

“1845, May 28th, No. 6 swarmed. On examination the same day I found four royal cells, all sealed up. After both notes of piping had begun, I found one cell open, and its queen gone, and all the others still sealed. (My brother apiarians will recur to this fact when going through my observations on the rationale of piping and swarming.) On the next day, again heard the long note of piping, and, soon after, two short notes—the first proceeding from the queen at liberty, which I have repeatedly witnessed, and the short notes from those still in the cells. On June 9th a second swarm came off, and on re-examination I now found six royal cells, three sealed and three open. The three sealed royal cells proved abortive, and the queens from those unsealed having migrated with the second swarm, the stock was left without a queen *or the means of rearing one*—the eggs left by the old queen when she accompanied the first swarm having approached too nearly to maturity to be converted into queens. On the 28th June, I gave the stock a bit of comb containing worker-brood of different stages of maturity. On the two following days no steps

were taken to raise queens. It then occurred to me that the presence of the abortive queen cells might have prevented the bees from availing themselves of the means thus afforded them of raising themselves a queen, as they might still be expecting one from them. I removed them, and on the following day, July 1st, on again examining the stock, I found four royal cells in progress on the bit of brood comb which I had given. On the 12th two queens were hatched, from two of the cells, the other two cells proving abortive. This piece of comb was presented to the Museum of the Entomological Society of London, as a standing proof of this much-disputed fact." The self-evident conclusion to be drawn from such experiments as these is, that all workers are females, but that under usual circumstances their reproductive organs are not fully developed.

Much difference of opinion has existed as to the offices of the drones, and the impregnation of the queen. It is, however, now pretty generally admitted that Huber was correct in his opinions upon these matters, viz., that the drones are the males, and that the queen is impregnated on the wing in the open air—an opinion which is strengthened by the fact, that the drones never alight when away from the hive.

### SWARMING.

Perhaps there is no better plan for commencing bee keeping than by obtaining some good stocks in the autumn, to be reserved for the production of swarms. A first swarm of the same season, hived in a common hive, should weigh, at Michaelmas, not less than 20lbs.; an old stock, a

pound or two more; while a second swarm may be considered safe if a pound less.

Notwithstanding all that has been said, about tenanting hives by the removal of the bees of other hives into them, there is no plan so safe or certain as peopling them by good early swarms. When these swarms are brought from a distance, it should be on the day in which they are hived, and in a cloth of coarse texture, which should be tied round near the bottom of the hive, so as to prevent the escape of the bees. Tie up the cloth by its corners over the top of the hive, and if carried by the hand, or properly suspended, a swarm may be removed in this manner for miles. •

The swarming of bees may be compared to the migration of colonies of people from populous communities. Dr. Bevan has claimed for me the settling of many points in "the philosophy of swarming," which had hitherto been mere matter of vague conjecture. Much of that which follows on the subject is the result of my own experience.

It is now a well-ascertained fact that the old queen of a stock emigrates with the first swarm. For myself, I have repeatedly proved this by tracing *marked* queens. I have marked the queens either by cutting off one of the antennæ, or a *small* portion of the tip of one wing.

The period which *usually* intervenes between the first and second swarms, is from nine to thirteen days. Between the second and third, the period is much shorter, the young queens quickly succeeding each other. There is an occasional departure from these general periods. In some, as I

have experienced, the first period may be extended to eighteen or twenty days. Such extraordinary intervals are most apt to occur in backward springs, in which, breeding being retarded, a first swarm issues on the first fine day after the deposit of the eggs in royal cells, in order that as little time as possible may be lost, during the important season for storing the new habitation with honey.

In the backward spring of 1829, these unusual intervals were very general with my swarms, while in other seasons the issue of the first swarm has been sometimes retarded until the royal brood are nearly ready to leave their cells. I have had a second swarm in four days after the first. Those who consider these matters will satisfy themselves that they account for a first swarm so seldom coming off unless in fine weather. The different ages of the royal brood, on the issue of first swarms, prove that these have at least a fortnight in which to choose the time of their emigration. However, the general time is about the period when the royal cells are sealed.

With regard to after-swarms, the law of primogeniture is strictly observed with the young princesses, the first-born being always allowed to go off with the new colony, and so on with respect to whatever number of swarms may follow. After-swarms are frequently accompanied by more than one princess. Indeed, it would appear that all which are ready to leave their cells (one only, be it remembered, being at liberty in the hive, until the moment of swarming,) go off with the swarm; leaving the more forward of the younger princesses to come off with subsequent

swarms, or "fight out" their title to the sovereignty of the parent stock at home.

The slain princesses may generally be found brought out after the issue of a second swarm, and also from such swarm when it has been accompanied by more than one.

Second swarms are much less particular in their choice of weather than first ones. The reason seems evident, viz., when the proper age of the young princesses has arrived, the swarm must go off, or not go at all, as the yet younger ones would be destroyed by the eldest, which had been at liberty for some days. This is frequently the cause of no second swarm issuing. To give an instance. On examining my Huber hive directly after its first swarm on June 9th, I found four royal cells, three sealed up, and one not sealed. On the 14th this cell was sealed, and the other three all open and their contents gone. On the 17th the remaining cell was empty. The first-hatched queen had been allowed to make off with the younger ones, and to remain queen of the stock, instead of leading off a second swarm. It will be seen, from these remarks, that from the time when the old queen leads off the first swarm until the first-born of the young princesses comes forth, there is no queen in the hive; the old queen having merely provided for the royal succession previous to her departure.

Repeated swarming is apt to weaken the parent stock too much.

If second swarms come in good time (say, for the south of England, by the middle of June at the latest,) and stocks are required, it may be well to preserve these swarms, for be it remem-

bered that after-swarms have always young queens, which is no small advantage; but if late, they had better be returned to the stock. I effect this, by spreading out the swarm upon a cloth, and catching the queen or queens, who will generally be found where the bees congregate most thickly; when the swarm, *if no queen* remain with it, will return home of its own accord. The operator must hive the swarm in a common hive, and hold it over the cloth, when a smart blow on the top of the hive will at once dislodge the bees. They may then be spread abroad and examined with perfect safety. As in all similar cases, however, the operator must *be quiet*, and *must not breathe upon them*. A hive (of Madame Vicat's construction) once persisting in swarming against my wish, I took away (between the 18th June and the 2nd July) the old queen and five young ones, before I could make the bees remain in the hive. This swarm, upon its last issue, weighed 7lbs.

A far better plan, however, than this returning of swarms, is to prevent their swarming; and this, with such hives as Huber's, or my improved Grecian hives, is easily effected. An instance of my own will best explain this. (Extract from my Journal.) "15th June, 1836, No. 6 having swarmed again after being returned, I determined on depriving the stock of its royal cells, and their contents. The swarm was hived in a common hive, and I then took out every comb from the stock hive (upon its separate bar,) and cut away six royal cells from them in different stages of progression. After thus removing *the cause* of swarming, I put back the swarm with its old

queen to the stock, exclaiming as I did so, 'Now Madam, you will stay at home,' and of course she did so, as there was no other queen to succeed to the sovereignty of the stock." Or, *after* the first swarm is gone off, subsequent ones may be prevented in this way. So soon as the *long* note of piping has been heard, cut away all the royal cells, as just described. The young princess, *already at liberty*, will then remain queen of the stock.

I trust that in these instructions such a knowledge of the proceedings in the interior of a bee hive is given, as will enable its owner to render these operations pleasingly subservient to his views.

In the examination just alluded to, I availed myself of the opportunity thus afforded of thoroughly inspecting the state of the brood combs, and found *worker*-brood in every stage. This is contrary to Huber's assertion that "an uninterrupted laying of drone eggs takes place for twenty days previous to and during the time in which the royal cells are tenanted." This is but one instance in which I had proved the incorrectness of this statement. Indeed, Huber afterwards gives instances to the contrary, and it is self-evident, when we consider the rapid increase of bees in a swarming stock, both before and after the issue of a first swarm, that this cannot be the case, or if so, from whence do the worker bees come?\*

Huber is also in error when he asserts that "the eggs of the first eleven months (of the

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\* See "Honey Bee," p. 39.



queen's existence) are always those of workers." I have known various instances in which young queens, under *two* months old, have bred a considerable number of drones, and probably it is very general.

This power of young queens to produce drones may, in some measure, account for the occasional issue of *very late* swarms, from stocks which had swarmed at the usual season. I once had a swarm in August, from a stock which had swarmed early in June. Here the *young* queen led off a swarm during the first season of her existence. I have known other instances of this unusual circumstance.

#### SYMPTOMS OF SWARMING.

The symptoms preceding a *first* swarm are the rapidly increasing number of the bees, the clustering or hanging out, and the drones becoming numerous. When these signs present themselves, let the stocks be closely watched. The distinctive symptoms of an after-swarm are curious, and peculiar to such. A few days after the issue of the first swarm, generally from nine to eleven, though instances, which have been before alluded to, of its occurring earlier, and of being retarded later, occasionally happen,—a singular noise, called PIPING, may be heard in the stock. The first note heard is long and plaintive, and is uttered by the princess already at liberty—as I have frequently seen her emit it. She traverses the hive, and stops upon or near the royal cells which still contain brood, and emits her long, plaintive note. This, when the other young queens are sufficiently forward,

generally in about two days, is answered by them from *within* their cells, in a quick, short, hoarse note. After these last have been heard for about two days, the swarm may be expected to come off. The only probable conjecture that can be given for the object of this *piping* is, that the eldest princess is made aware of the state of progression in her rivals by the sounds emitted by them. Huber has told us much about this piping of the elder princess being a peevish, irritable venting of her ire, at being prevented by the bees from attacking the cells of her rivals. That the bees do protect the other queen cells, I am quite willing to admit; but that this piping of the queen at liberty is in consequence of such protection, I am prepared to deny. In every instance in which I have *seen* her whilst uttering it, the only care of the bees seemed to be *to get out of her way*. Persons who are anxious to know more on this curious subject are referred to Dr. Bevan's chapter on "Symptoms prior to swarming," where my observations are given more at length; and I have now only further to add upon this point, that unless the royal voice can be heard *about* the period stated, no after-swarm will issue, unless under the unusual circumstance of a young queen leading off a late swarm, as before adverted to.

In 1830, the rapidity with which second swarms succeeded the first, was as remarkable as their tardiness in 1829. I had two families in which piping commenced on the third day; and, in one of them, the second swarm issued on the fourth day. The weather had proved so very unfavourable, that the "*Old ladies*"

deferred coming abroad as long as they well could.

A strong first swarm occasionally sends forth another swarm. This generally occurs in about a month. In Kent, such swarms are called *casts*.

### HIVING OF BEES.

Whatever may be the system adopted, let everything be in readiness for the reception of swarms, for even where the system is generally unproductive of swarms, some stocks may well be left single for this purpose. Use no *dressing*; a dry, clean hive, is all that is required. Let every hive and its accompanying apparatus be separately weighed and registered. By this means the weight of the *contents* of a hive is easily known. When a swarm is *up*, silently watch its settling, and as soon as it has pretty well done so, hive it. When you have got the bees quietly settled in the hive, never mind if a dozen or two remain upon the wing, for they will return to the stock; but carry it to its destined stand at once. By thus associating the earliest proceedings of the bees with their new standing, it will prevent their loitering about the settling-place, and, consequently, that loss of their labour, which is produced by leaving them where first hived during the first day's occupation of their new dwelling.

After the swarm has been shaken into the hive, keep agitating the bough upon which it had clustered, and the bees will soon join those about the hive.

In all operations of this kind, it should be borne in mind that where the greatest hum of congregation is kept up, there it will be easiest

to assemble the whole colony. If any peculiarly shaped hive is required to be tenanted, into which it is difficult to hive the swarm,—hive it into a common cottage hive, and dislodge the bees from it into the other. If even this is not to be easily effected, as with Mr. Munn's "Bar and frame hive," or the "Unicomb hive," place the hive upon a cloth, slightly wedge up one side, so that the bees may enter, and knocking down the bees from the common hive upon the cloth, at a foot or two distance, *run* them in by directing them as you wish. If they cluster upon the sides of the hive, or are tardy in getting in, brush them in with a Bavarian broom, and occasionally draw back the hive so as to have a *living stream running* in its direction. If you once hear a pretty strong *hum of recognition*, you are getting on well. Bees are seldom disposed to sting at swarming time; and if you are quiet, and careful neither to crush any, nor to breathe upon them, you may do nearly what you please with them. Of course, in the difficult hivings just alluded to, if you are fortunate enough to capture the queen, and can put her into the hive, with as many of the bees as you well can, you will have little further trouble. Should the bees begin to cluster upon yourself, or your assistants, immediately dive among shrubs, or run into a darkened room, into which a little light through an open space must be admitted. To this aperture, it is likely the bees will fly, and leave you. In all such cases be careful, and above all things *quiet*; and if the bees do not leave you, let the queen be searched for; and gently brushing off some of the bees into a hive, put her among them, and then

getting close to it, your troublesome visitors will soon leave you. Alarming instances such as these but rarely occur, but it is right to describe the proper line of conduct to be adopted, should they do so.

Sometimes a swarm will come off unaccompanied by a queen, while in other cases a defect in the queen's wings may occasion her to fall on leaving the hive. In either of these cases, the swarm will return to the stock, and probably these are the only reasons why they occasionally do so. After queens have attained the age of three years, they very generally become less prolific. It will mostly be advisable to take away a disabled queen when found unable to fly, leaving the swarm to come off with a young queen, when the period for a second swarm arrives. A labourer of mine, however, George Waters, an excellent practical apiarian, had a queen, which, on account of some injury in one of her wings, was unable to fly the distance of a yard, yet had led off a first swarm three successive years; and each time had been taken up by Waters, from the ground on which she had fallen, and joined to the swarm. She died early in the spring of the fourth year. Indeed, I have several times purposely deprived a first swarm of its old queen, before returning it, for the sake of securing a young one.

If the weather be not favourable for honey-gathering soon after a swarm is hived, it is an excellent practice to feed it. A little honey, or the compound hereafter to be described, greatly encourages the bees, which, instead of becoming weak and inactive, for want of sufficient food, will go on rapidly with comb-building—the queen

at once commencing to lay eggs, and thus are they prepared to take advantage of the fine weather when it returns.

Small swarms may be joined to each other, or removed by fumigation, and bees *driven* from the stocks it is intended to take the honey from, may also be joined to others. But after all that has been said in favour of joining swarms, it should be borne in mind that the bee is a short-lived creature, from 6 to 8 months only, and that no stock can permanently retain more bees than *the breeding of one queen can maintain*. Hives may still, however, be strengthened in this way, and humanity will occasionally find instances in which the lives of bees may be saved by the practice. The most simple way of effecting the junction is to knock out the bees upon a cloth, and then, placing the hive containing the others, close to them, with its edge wedged up, they may easily be directed into it. A puff or two of smoke blown into the hives immediately before, may tend to prevent fighting.

The evening is the proper time for effecting this, and the entrance to the former home of the intruders should be covered, and disguised, so that they should not find it when coming abroad next day.

### ON HIVES AND BOXES.

The common cottage hive is too well known to require description. The size of these should be adapted to that of the swarms, being relatively larger or smaller according to their size, and period at which they come off.

These hives, when occasion requires, may be

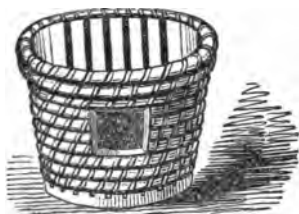
enlarged by *ekes*, viz. by the lower portion of a common hive being cut away, and placed under the hive. A board, with holes of not less than an inch in diameter, should be placed between the hive and the eke. One of my adapting boards, hereafter to be described, would answer the purpose.

It is a good practice *on all such occasions* to break up the hive some little time previously, after which the hive may be lifted without disturbing the bees, and the eke placed under it. Should the bees be inclined to fly, a puff or two of smoke may be blown under the hive. The old entrance to the hive, and the junction, should be carefully stopped.

There are many varieties of hive suited to the views of the inventors and their followers. A brief description of the chief of these will be given. Perhaps the most effective and generally useful hive, both for the scientific and practical apiarian, is the Grecian hive, with a bar as a foundation to each individual comb. A knowledge of the principles of this hive was first communicated to the English apiarian by Mr. Wheeler, of Charing, in Kent, in his "Journey into Greece," before quoted. In describing the neighbourhood of Mount Hymettus, and his hospitable entertainment at a monastic institution, he says, "After I had discoursed some time with the good old Caloyer (Priest,) I was conducted into a garden, furnished with four or five hundred stocks of bees. The tops are covered with broad flat sticks, along each of these the bees fasten their combs; so that a comb may be taken out whole, with the greatest ease imaginable.

The good old Caloyer presently brought me of delicate white honey combs, with bread and olives, and very good wine."

These hives were first made more generally known by Mills, in his very valuable "Essay on the management of Bees," (London, 1766)—a work which first brought to our knowledge most of the improvements which had been made in bee management, both at home and abroad; and which work has been most unconscientiously pillaged by succeeding writers, too often to the very letter, without acknowledgment. It has well executed plates, very striking likenesses of which may be found in subsequent publications.



THE IMPROVED GRECIAN HIVE.

Introduced to this hive, by Huish's adaptation of it, I was at once struck with its capabilities, and set myself to work to render it simple and certain in practice. How far I have succeeded, I leave to the decision of the apiarian world. My friend Dr. Bevan has given, in the "Honey Bee," an elaborate notice of my humble endeavours in this direction. *Whatever the construction of a hive*, without some such facility as bars, whereby every comb can be made *individually available*, there is something wanting, something wrong. To say nothing of the use of such bars



for deprivation of honey, it may be asked, how, in most of our new inventions, the apiarian could have deprived a stock of its royal cells, as already described in my experiments?

My modification of the Grecian hive is thus described in the "Honey Bee" (p. 91.) "The most approved size for a storifying straw hive (for it must be borne in mind that these hives are alike available for storifying, partial deprivation, or single hiving,) is 9 inches high by  $11\frac{1}{8}$  inches wide at the top, gradually tapering down to  $10\frac{1}{2}$  inches diameter, in the *clear*. The lower round of straw should be begun upon a wooden hoop, the bottom of which has been planed smooth. Where an entrance is not provided in the floor board, one should be cut in the hoop three inches long, and  $\frac{3}{8}$  of an inch high. The hoop should be perforated in an oblique direction at regular distances, so as to cause all the stitches of the hive to range in an uniform manner. A small flattened rod of hot iron following the gimlet adapts the holes to the splits with which the hive is sewed. The bars should be half an inch thick,  $1\frac{1}{8}$  inch wide, and seven in number. If properly adjusted, there will be interspaces between them of about half an inch. A slight inclination to approach nearer may be given to the centre bars, while the exterior ones may be allowed what is thus afforded them. After much care and many experiments, I have long adopted the rules here given as approaching the nearest to the natural requirements of the bees. The slight variation just named is intended to suit the breeding width of combs in the centre of the hive, and to allow somewhat for the elongation of the *honey*

cells towards its exterior. The top of the hive should be so constructed as to form a rabbet for the ends of the bars to rest in. A band of straw is worked round the top exterior to, and upon a level with, the upright finishing band. Upon this, place another band, of the thickness of the bars. This obviates the necessity of luting, and gives a finished appearance to the hive, by forming a cornice round it. Small pegs are driven through the ends of the bars, so as to project about half an inch. These are pressed into the straw, and thus keep the bars properly adjusted. Pieces of clean worker comb should be reserved for guide combs (or decoys for glasses.) Upon each of the side bars, nearest the centre one, a small piece of comb should be fixed. This is easily effected by heating a common flat iron, slightly warming the bars with it, and then melting a little bees'-wax upon it. The comb is now drawn quickly across the heated iron, and held down upon the bar, to which it firmly adheres, if properly managed. These pieces of guide comb need not be more than two or three inches in diameter; but if larger ones can be spared, they will be advantageous, particularly for small, or late swarms, or in storifying, when they act as decoys. Care should be taken that the pitch, or inclination, of the cells, is upwards from the centre of each comb."

To fix guide combs in glasses, slightly melt the edge of the comb, and quickly adjust it to the glass. If the combs reach to within a quarter of an inch of the adapting board, the bees will take to them freely, and be less likely to build upwards from the adapting board. A little honey put

upon the comb is an additional inducement.

The benefits of an easy removal of combs for any required purpose is too obvious to need further comment. An important one not generally known to apiarians, was first presented to my attention by a veteran apiarian, my friend, the late Mr. Harman, of Cranbrook. He had often noticed the superabundance of drone-celled combs in storified stocks, and our subsequent experience has fully shown that these frequently predominate to such an extent as to render such divisions of a storified family wholly unfit to leave single for a stock hive. Now, with bars, these may be removed, and others substituted in their places. It will be well to observe, however, that the hives and bars should be so adjusted to the dimensions given, that each bar should be suitable to the same place in every hive.

Bars had long been adopted by apiarians. Keys, Wildman, and others, recommended them; but no definite rule for their practical application had been promulgated. So little was known of their utility in practice, that my friend, Dr. Bevan, in his first edition of the "Honey Bee," though advising the use of bars, recommends that they should be fastened down; thus doing away with every use for which they were intended. It is right, however, to observe, that Dr. Bevan was among the first to appreciate their importance when properly adjusted, as the 2nd edition of his elegant work, the "Honey Bee," fully proves. The general fault of those who adopted bars, was, that they made them too wide, so that the bees—of course adhering to their own rules—building regularly throughout, often attached two combs

to one bar; or built across the intervening spaces.

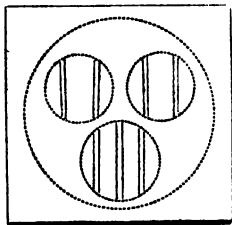
The improved Grecian hive is covered by a flat straw top, which projects about half an inch over its edge. A glass window is introduced behind. To effect this, run down two wooden skewers at the required distance apart, and sew the rounds of straw with wire, just *within* the skewers. This gives such firmness that the hole and rabbet to receive the glass may be cut out with facility. The glass should be secured with putty, and darkened by fastening a piece of cloth before it.

For myself I prefer hives made of straw, but those who give the preference to wooden boxes, should have them made of good, well-seasoned, inch deal. A rabbet should be provided to receive the bars, which latter should be adjusted as directed for hives. The size of the boxes should be  $11\frac{1}{2}$  inches square, by 9 inches deep, in the *clear*. They had better be panelled together; as, when the sides are made from one piece of deal, they are apt to split. A cover, clamped at the ends, to screw down upon the bars, will be required. Let the screws fit easily, and be greased, so that they may be taken out with facility. Loose floor boards will be required for the boxes. An inclined plane cut into the floor board, 3 inches wide and  $\frac{3}{4}$  in depth, extending from front towards the back of the hive, gradually running off in depth to nothing at or behind the centre of the floor, will both give egress to the bees, and drain off the condensed steam. These entrances in the floors may also be adopted with hives, as well as boxes, if preferred.

Adapting boards will also be required. These I have so fashioned that they are equally adapted

for the separation of stories, and for the surmounting a stock with three small glasses, or one large one.

A square board of the full size of the exterior band of the hive, has a circle struck upon it, of the diameter of the *inside* of the hive. Within this, three small circles are marked; and *within these*, interstices are cut out corresponding with those between the bars of the hive. The interposition of these boards greatly facilitates the separation of stories. Any little misfit or crevice through which the bees may get out, is best stopped with a bit of tea lead, a store of which should always be kept for such purposes.



THE ADAPTING BOARD.

Having been frequently requested to supply these hives to apiarians in different parts of the kingdom, some years since, I instructed an ingenious workman in their construction. Fully conversant with the whole details of their manufacture, and practically a first-rate apiarian, hives from his hand have a decided advantage over any which a common hive maker can make, however carefully superintended. I allude to George Waters, whom I have before mentioned, one of the best practical pupils I ever had. A line ad-

dressed to myself will insure attention to any demand for these hives, for Huber's, or the Unicomb.

Having thus gone rather at length into the description of the hive which I recommend for general purposes, the *principles* of which I think should be adopted in most hives, being certain that they would thereby be rendered of much greater practical utility than they ever have been, or can be, without attention to some such provision,—I shall now somewhat more briefly give a description of other hives generally known to the scientific apiarian, referring the more curious reader to the works in which they are described more at large.

First upon the list stands the "LEAF-HIVE" of the celebrated Huber. Perhaps I cannot give a better description of this hive than by a quotation from the "Honey Bee." It should be premised that the principle on which it is constructed is, that it admits of opening between the combs, as its name applies, in the manner of the leaves of a book, supposing every separate comb to be a leaf. Dr. Bevan says of Huber's original hive, "The leaves were too narrow to be applicable to all purposes, and the hive altogether has been so much simplified by Mr. Golding, that I shall confine myself to a description of the particular form and dimensions which he has adopted." This modification, I may here remark, was in accordance with my experience gained in perfecting the Grecian hive, the width of bar intended for the foundation of each comb being the same in both. "The general width of the leaves (continues Dr. Bevan) should be an inch and five-

eighths, but slightly varying in the same proportion as recommended for the bars of the Grecian hive. The *exterior* dimensions of this hive are 1 foot  $2\frac{1}{2}$  inches high, by 1 foot 1 inch deep from front to back; the width will depend upon the number of leaves; the number usually employed is eight, but spare leaves may be kept to use if required. The perpendicular portions of the leaves, at the front and back, converge at the bottom towards each other, so that at the top the interior of the hive, from front to back, measures eleven inches, at the bottom only ten inches. By this the combs are made to approach a wedge-shape, and are consequently better supported. The upright pieces are, of course, kept in their positions by having the top pieces tenoned into them; and are further held together by a small cross bar, also tenoned into them, about half an inch from their lower ends, so as to allow a free passage for the bees beneath. A series of these leaves being placed side by side, secured at the front by *shifting butt hinges*, so that every leaf can be taken out, and at the back by hooks and eyes, and having a glazed door covered by a shutter at each end, constitute what, I think, will be found an improved modification of the hive of Huber."

Dr. Dunbar has made an improvement by ploughing out the interior edges of the leaves to within the eighth of an inch of their outsides. This contrivance effectually prevents the bees from being crushed when the frames are closed. Three-sixteenths of an inch from each side will be sufficient to effect this, as when two are closed together, the opening will of course be three-

eighths in width. The conjoined leaves should be placed upon a floor-board of sufficient length to prevent the bees from escaping beneath them, when the hive is opened for inspection. By attaching a piece of guide comb to the top of each division, in the manner already described, the bees will be induced to construct their combs with such uniform regularity, as to admit, at any time, of the opening of the hive to inspect the interior, or to remove an entire division.

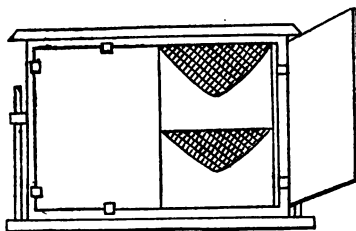
As the bees will occasionally vary their work in such a way that no rule can be laid down to meet it, a good plan is, daily to inspect the proceedings of a swarm newly hived in any hive in which the position of the combs is of importance; and should there be occasion, adjust the combs, and thereby prevent much subsequent inconvenience.

Should this occur in one of my Grecian hives, the bar or bars may easily be removed, and the combs rectified, or others substituted for them. It is of the first importance that the combs in a Huber hive be built in the right direction, and consequently every means should be adopted to ensure this.

The UNICOMB HIVE, which is intended to hold but a single range of comb, so that all may be under view, is made use of more for scientific inquiries, and easy observation, than from any idea of its being either a good storehouse for honey, or a fitting residence for bees. The frame, which contains the comb, is two feet long and eighteen inches high, inside measure. This is the size given in the "Honey Bee," but I am of opinion that the length may well be reduced by six



inches. Preferring, as I do, to tenant this hive with an after-swarm, in order to watch the proceedings of the young queen, I think this reduced size quite large enough. The frame at both top and sides is two inches broad. Two sticks, crossing each other, of about three-eighths of an inch square, are fixed in the interior, for supporting the comb. A piece of guide comb is attached to the top for direction to the bees. The frame thus prepared has sashes of four squares on each side, which squares are merely sprigged in, so that they are easily removed. The sashes are closed with shutters, and the opening of the bottom is stopped by a board fitted so as to take out. The entrance is at one end.



THE UNICOMB HIVE.

In a hive of this description I have made many of my observations, and repeatedly have raised artificial queens.

When you wish to deprive one of these hives of its queen, gently take out the square of glass opposite to her, and immediately seize her; for, apparently from some superior instinctive pre-sciency of danger, she is always much more on the alert than any other individual bee, and will, if not secured promptly, dive out of sight among

the bees, directly any noise, or the introduction of air, apprises her of something unusual.

Various modifications of collateral boxes (boxes placed side by side) have been used. The Rev. Stephen White, Rector of Holton, in Suffolk, was the first who gave to the press his views on boxes thus arranged. See his "Collateral Bee-boxes," a tract which is now very scarce (my copy is the 3rd ed., London, 1764.) It is an interesting little work. I had six pairs of these boxes in operation for some years, but discarded them; finding it impossible to keep the queen from breeding in *both* boxes. It should be understood that Mr. White so arranged the size, and managed his boxes, as *not* to prevent swarming. Collateral hives have been adopted by Mr. Nutt, and through his activity in promulgating his views, and selling his boxes, the apiarian world are now pretty well acquainted with them. His idea of the regulation of the temperature is an ingenious one, but unfortunately it is not of much practical utility; the bees constantly stopping up the air holes in the ventilating tube recommended by him. The degree of temperature requisite for the formation of combs approaches very closely to, or is perhaps quite as high as, that required for the maturation of brood, and, consequently, the object proposed to be attained in lowering the temperature by ventilation, and thus preventing brood from being deposited, either fails, or, if it succeed, it prevents the elaboration of the wax.

Madame Vicat, an ingenious Swiss lady, adopted a modification of the collateral hive, in which the whole interior is open from end to end,

but may be taken apart in divisions, which, in my adaptation of her ideas, I made to contain three combs each. But in this hive the queen has no impediment to her breeding in any part of it, and a primary objection thus at once presents itself.

I wish it to be understood that although my general instructions may apply more particularly to storifying, I am not prejudiced in favour of any particular arrangement, and that those who prefer boxes placed collaterally, can easily adapt mine so as to be alike available for that system, or for storifying. All that is required is to make openings at the top and bottom of the sides, for the passage of the bees. These, when not required, can be closed with slides. One strong argument in favour of storifying is, that the bees are inclined to carry the honey into the super in obedience to their instinct, which teaches them to store it at the greatest distance from the entrance.

"THE BAR AND FRAME HIVE," a conjoint application of the collateral and my Grecian hive, by W. A. Munn, Esq. (see his work \* "The Bar-and-Frame Hive,") is a pleasing adjunct to an apiary. The frames containing the combs are of the width given for my bars, and are so arranged as to draw out into a glazed case, by which contrivance the works of the bees may be examined with ease and safety.

There are various other descriptions of hives, but as the principles of most are comprised in those already described, it is needless to encum-

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\* Van Voorst, London, 1844.

ber a work like this, in which conciseness is a leading feature, with their description.

#### GENERAL PRACTICAL INSTRUCTIONS.

When it is desirable, either for the deprivation of honey, or for any investigation, to take out combs from the Grecian hive, gently break up the straw top and blow under it a few puffs of tobacco smoke. The top may then be removed. If a side comb is to be extracted, the other part of the hive may be covered with a spare floor board, or the like. A few puffs of smoke may now be blown down the sides of the comb to be taken out, which will intimidate the bees, and drive them from the part of the hive you are operating upon. A double-edged knife blade, an inch and a half long, and three-eighths of an inch wide, turned at right angles, from the end of an iron rod of about a foot in length, is now passed down the edges of the comb, to detach them from the hive. After this is done, the comb may be easily lifted, such bees as still adhere to it being swept down into the hive as the comb is lifted upwards. Such operations as these are much less formidable than many persons believe. The fact is, the bees, when once intimidated by the smoke, may be done almost anything with. The sudden introduction of light is also, doubtless, a powerful auxiliary in confounding them. Again, they are attacked at a point which they are unused to defend, and as a consequence, as I have frequently pointed out to my visitors, all these causes acting upon the bees together, render them less dangerous to the operator than would be his standing *before* the mouth

of the hive for one minute on a hot day. I introduce these observations here for the application and guidance of the apiarian reader on all similar occasions. I seldom get a sting when operating, excepting from some downright act of carelessness of my own. Quietness and a little tact are all that is required.

When combs are taken out, they may either be detached from the bars at once, and the bars returned, or spare bars may be kept on hand with which to replace such as have been extracted. The top of the hive should be replaced in the same position as when taken off (so that the propolis upon the top may again adapt itself to the bars as before,) and it should be kept down for a day or two with three bricks, or something equally heavy.

Be careful not to take too much honey from your bees, but rather be content with your fair *share* of the partnership; for in this view only should your connexion with them be considered.

#### STORIFYING.

The piling of hives upon each other has long been practised for the purpose of enabling the apiarian to deprive the bees of a share of their stores. Many of the older bee masters recommend this to be effected by *nadir*, that is, by *under* hiving, but as this involves the very objectionable practice of taking away the stock hive, and thus having the honey of much worse quality than where *super*, or top hiving is practised, it cannot be recommended; for the brood comb is principally found in the part of the habitation nearest to the entrance, and the *store* in

that part furthest from the entrance. In the first place you would run a great risk of destroying your colony, were any portion save the original part of the hive to be reserved for a stock, as it would probably contain much too large a proportion of drone-celled comb; and in the next, your honey would be the produce of old, dark combs, and mixed with a large portion of farina. The mode of procedure which I would recommend is the following. When, in the spring, you find, from the increased number of bees, the heat of the pane of glass, and the favourable appearance of the weather, that it is likely further space is wanted,—prepare your hives with guide combs and get everything ready to your hand. Then gently break up the straw top and blow a few puffs of smoke under it. The top may then be removed. The adapting board may now be adjusted upon the bars, and the hive (*super*) at once put upon it. Stop the entrance to the super from without, for at no time should any entrance be allowed except the original one in the lower hive. The cover which had been taken from the stock may now be weighted down upon the super. The period when further room should be given is a matter requiring some judgment; for if given too soon, the bees may in a great measure desert the super; and if delayed too long, they may be induced to swarm. However, when the super is pretty well filled, and the bees show indications of requiring further room, particularly if the weather is warm and fine, then place an adapting board upon a hive or box ready for introducing it *under* the stock; which may now be gently loosened from

the floor, by an oyster knife or something of the kind, so as to permit the operator to blow a little smoke under it. Then lift both the hives together from the floor, and place them on one side upon two sticks, so as not to crush the bees. If many bees remain upon the floor board, brush them off out of doors, or substitute a fresh floor board; then, placing the nadir upon the floor board, lift the other hives upon it, and stop the old entrance, as before directed, leaving an entrance in the nadir. If further room is required, which is but seldom the case, let this also be given at the bottom—the original super surmounting the stock always retaining its place at the top of the colony. Where glasses are used, the same procedure is followed as with supers. In these directions no mention is made of dividers (plates of brass or zinc,) so general in all former instructions upon storifying. The fact is, the business is much better performed as directed, without them. Dr. Dunbar, like myself, has long since discarded them. Dr. Bevan observes, "These instruments have been discarded from the apiaries of my two friends, Golding and Dunbar."

When the weather is sultry, give as much air as you can to the apiary. The stories may in such cases be lifted apart upon little bits of sheet lead, particularly between the stock and super. This is a simple but effective method of ventilating, and by occasionally passing something along the opening it may be kept clear. A stock, hive, well furnished with worker combs, should be superhived as long as its tenants prosper.

#### DEPRIVATION OF HONEY.

It is but seldom that honey can be spared from

a swarm the first year of its settlement; but, in an unusually productive season, a side comb or two may be taken out. It should be an invariable rule never to remove an upper hive or box till an under one be quite full, nor to diminish the weight of a stock hive below 17lb. or 18lb., exclusive of the hive itself, and its appurtenances.

When it is found that the combs of a super hive are well filled, and most of them sealed up, it may be removed. Proper room having been given by nadir hiving the colony, it may generally be assumed that neither brood nor the queen will be in the super; but it had better be examined previous to removal, and if it contain brood, let it remain until the brood be hatched out. Gently break up the super from the adapting board, blow a few puffs of smoke under it, and at once lift off the super; placing it upon two sticks to avoid crushing the bees. The adapting board may now be removed, and the hive closed down with a spare top, or temporarily by a floor board, until the top from the super can be had. An out-house or spare room having been prepared and darkened so that only a small portion of light is admitted (the whole of such light communicating with the open air,) the super should at once be placed in it, when the bees, finding their isolated condition, will very generally fly home to the stock without giving much trouble. The top should be taken off, and the hive wedged up from the floor at bottom. If the bees are sluggish, a few raps on the hive will rouse them. Such as show themselves may be brushed off with a Bavarian broom, and they will at once fly to the light and return home.



The darkene droom is used, because, while affording light enough for the escape of the bees operated upon, enough is not afforded to allow of the intrusion of others. The best time for such operations is the forenoon of a fine warm day, as, the more active the bees, the less will be the trouble in dislodging them. If the bees in the super persist in remaining quiet, and particularly if those in the stock are in agitation, it may be assumed that the queen is in the super. Under such circumstances *driving* (hereafter to be described) must be resorted to, or the super returned to the stock hive; trying again in a day or two. This plan of removing supers is almost a self-acting one, and is much simpler than driving, the bees leaving their stores of their own accord, in obedience to their instinct of not staying apart from their queen, and to their fears when finding themselves in an unknown position. Glasses are treated in the same way, excepting that they had better be removed on the adapting board.

If the season be too far advanced to permit of any hope of further addition to the stores of the stock, calculation should be made as to whether it requires the return of any of the contents of the super, and its required weight be made up as hereafter directed.

Excepting in unusually productive seasons and situations, it will seldom be advisable to put on a second super, as what is afterwards collected had much better go to the further enrichment of the stock. Nadir hives but seldom contain either much honey or brood towards the autumn, and when the weather becomes chilly, and the bees are found of a morning to have deserted the nadir,

it may be removed by puffing a little smoke between its adapting board and the stock hive. If there are any bees in it, this had better be done when the sun is shining, when, placing the nadir in its rays, the bees will not be chilled, but leave and fly home. It is but seldom that colonies should be left doubled during the winter. If, however, the super contain the greater part of the honey, and is well furnished with worker-celled combs, it may be left upon the stock, or the stock may be removed if it do not contain brood, and if the bees appear to have pretty much deserted it, particularly if the combs are very old. But these proceedings are exceptions, the safe rule is to reduce colonies down to the stock hive in winter. The bee-keeper should not be deterred by the quantity of honey required in the stock. I have had a stock which stored away 9lbs. of honey in less than thirty hours.

Both nadirs and supers, as has already been intimated, are very generally furnished with a large proportion of drone-celled combs. As these should not again be presented to the bees; when the hives are wanted, they had better be taken out, and some of the largest be reserved for feeding with. The worker-celled combs had better be left either to hive swarms in—particularly late ones,—or again to be used in storifying, especially for nadir hiving; for be it remembered that the advantage to the bees, of thus being provided with a furnished house, is much greater than any little value of the combs for wax. Those hives with the whitest combs may be left for supers. A hive furnished with combs is of very great advantage to late or after swarms. The

latter are very generally small. In an empty hive, the greater number are, consequently, compelled to remain at home in order to maintain the heat necessary for the formation of combs. Now, if combs are given, the greater part of the bees at once leave the hive in search of stores, and should a few fine days follow their settlement, will frequently lay in a winter's supply, while those not thus provided would not have the means of taking advantage of the weather.

#### FEEDING.

The safe rule is to make up the required weight at Michaelmas. It has already been advised not to leave stocks with less than 17lb. or 18lb. of *contents*. An approximation to the way in which this is made up is as follows. Say—bees 2lbs. to 3lbs.; combs, &c. 4lbs.; food 10lbs. A pound less will suffice for a swarm of the current season, particularly if it be an after swarm.

If at this time a hive does not weigh so much, a sufficient quantity should be *supplied*, either by restoring a part of the combs that have been removed from the colony, previously unsealing them; or by the presentation of liquid honey, or syrup, in drone-celled combs, which should be reserved for the purpose. The best plan of effecting this is, by placing an adapting board upon the stock requiring feeding, and upon this place the feeding comb, or a pile of combs, separated from each other by sticks about the size of one's finger, covering the whole with a spare hive.

If a hive require feeding, which is not accessible at the top, an adapting board may be adjusted upon one of my hives, and the other hive placed upon

it. But when it can be done, it is much better to feed at the top, as there is then less danger of interference from other bees. In all cases, care must be taken so to adjust the hives that no bees can pass either out or in, excepting by the usual entrance. When, as is sometimes the case, the bees, instead of removing it, are disposed to store the food in the combs in which it is given, take them out, and draw the edge of a knife thickly across the cells; this disturbance of the honey will induce the bees to remove it into the stock. In all cases, be sure to slice off the sealings of the cells, before giving honey comb to the bees.

The following is my recipe for artificial food, as extracted from the "Honey Bee," see p. 206 — "For the purpose of forming a closer imitation of honey, by increasing the pungency of the compound, Mr. Golding combines with his syrup a portion of wine and rum: his proportions are, sugar 1lb., honey  $\frac{1}{4}$ lb., salt a teaspoonful, beer of moderate age one pint. Boil for a minute, and as the syrup cools, add to it half a glass of wine and a table-spoonful of rum." When honey is not easily to be obtained, this compound is an excellent substitute, and in unproductive seasons I have frequently had occasion to give it largely. Indeed, my very intelligent apiarian friend, Mr. Humphrey, of Staplehurst, has successfully carried a family of bees through the winter upon sugared ale alone. It is, however, desirable that as large a part of the winter's supply as possible should consist of *pure honey*, in a liquid state, fresh from another hive. I repeat my advice to make up the required weight of a hive in

the autumn, but if a little is required in the spring, there is no better way of administering the syrup than by turning up the hive and pouring it into the outside combs. If the hive be broken up some little time previously, it may be gently turned up without perhaps a single bee taking wing. A pipe of tobacco may be at hand, but if care be taken there will be no occasion for using it. Indeed, these little affairs are much less formidable than is generally imagined. Food given in this way in the chilly weather of spring, is at once rendered available to the bees without their leaving the hive. Not less than a pound should be given at once. Feeding by dribblets is never to be recommended.

#### DRIVING.

Occasions will sometimes arise in which it is desirable to remove the bees from a hive, either to take its stores or part of them, or, indeed, as Dr. Bevan justly observes, "It may also be rendered subservient to a variety of uses, such as the regulation and removal of combs, searching for and catching a queen, forming artificial swarms, &c." Proceed as follows:—Towards dusk, when the family will be all at home, let the hive be raised gently from its floor board, and supported on wedges about half an inch thick. When the bees shall have quietly ascended from the floor into the hive, it may be inverted steadily on a small tub or pail. An empty hive, of the same diameter, being at hand, should be quickly set over the one turned up to receive it. A lighted pipe may be ready to give a puff or two, if necessary, but the operation may generally be ef-

fect without using it. Tie a cloth firmly round the junction of the hives, so that the bees cannot escape. Proceed to drum upon the hive (opposite the sides of the combs, so as not to detach them) with the open hands or a couple of sticks; the bees will be so alarmed that in a few minutes they will have ascended into the hive set over them. A hive, full of combs and well peopled, always drives better than a weak and partly filled one. The operation should never be attempted excepting in warm weather. If the object be to furnish another hive with the bees, there is nothing to do but to reverse the hive in which they are, and place the other upon it, again tying the cloth round the junction. A few raps upon the peopled hive will cause them to ascend, and, early next morning, they should be placed upon their usual stand. Those who still adhere to the common cottage hive, may, by driving, deprive well stored families of part of their honey. Having previously weighed the hive, calculate how much may be taken with safety, and take from the external combs accordingly. The bees may then be returned as directed. I have on different occasions assisted in taking large quantities of honey in this way, and remember giving verbal instructions to a cottager, who took from a single hive 10lbs. of fine honey, which he sold for fifteen shillings; leaving his bees amply provided for the winter. In one instance, in 1826, myself and Mr. Humphrey assisted Mr. Harman in taking 300lbs. of honey, in one day, from common cottage hives, by driving alone.

#### FUMING BY PUFF BALLS.

It will sometimes happen that driving will not

dislodge bees so thoroughly as is required; resort must then be had to fuming, either instead of driving, or to clear a hive when driving has failed to do so. The material for this purpose is the *Fungus Maximus*, or Great Puff Ball. These are found towards the end of summer in woods and meadows, and they should be gathered when just beginning to turn brown, and thoroughly dried in the sunshine, or in a dry place, but not *near* the fire. When dried, they may be preserved in paper bags, hung in a dry place. A good instrument for fumigation is a tin vessel about the size and shape of a quart pot, to which a close cover is fitted. Near the bottom of this, a tube is inserted, of say half an inch in diameter, with an elbow so as to allow the tube to stand upright by the side of the fume pot. This tube is to blow through, to keep the puff burning. On the opposite side, and at the top, another tube, of six inches in length, is introduced horizontally. A moveable wire grating is adapted at three-fourths down the depth of the pot. Upon this, lay a few pieces of puff ball about the size of an egg. The hive to be operated upon is set over an empty one of the same diameter, and a cloth tied closely round their junction. The puffs are set on fire, and the upper tube of the pot being introduced between the hives, and the lower one being blown into so as to keep the puffs ignited, and drive their fumes into the hive, the bees will soon be heard falling into the empty hive placed to receive them; and in a few minutes the hives, after being rapped a little to shake down the bees, may be separated, and the bees disposed of as required. In about a quarter of an hour after

the admission of fresh air, they will have recovered, without receiving any injury. This method is very serviceable for joining stocks, catching a queen, partial deprivation of cottage hives, &c. &c.

Mr. Taylor has found the fungus *Racodium Cellare*, or mouse-skin *Byssus*, equally effective. "It may be found growing in large wine or beer vaults."\*

Ether has been successfully applied to stupify the bees, but as the requisite apparatus is necessarily more complex, it is not likely to come into general use.

#### PASTURAGE.

Very much depends on the resources of the neighbourhood for the success of our bees; for though the apiarian may cultivate such plants as mignonette and borage, yet it is to the surrounding country, to which he must look for the filling of his hives—to the heaths, the woods, the white clover, sanfoin, tares, beans, buckwheat, &c. Farmers who keep bees might greatly assist them by sowing buckwheat; if for seed, during the month of June, if to plough in, the beginning of July will do. The shade, and addition of vegetable matter, thus given to the soil, are of great service to it. Roll down before ploughing in. Sow about  $1\frac{1}{2}$  bushels of seed per acre. White mustard, to plough in while green, may be sown as late as August, and adds a large quantity of vegetable matter to the land at a trifling expense. Two gallons of seed per acre is the quantity I

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\* "Bee-keeper's Manual," 3rd Ed. p. 99.



have used. Both buck-wheat and mustard require the land to be previously well pulverized. Buck-wheat should not be sown after the first week in July at the latest, as if not ploughed in before the end of September, the risk is run of having it spoiled by the frost. Mustard is much more hardy, and will resist several degrees of frost uninjured.

The neighbourhood of willows is of great advantage to the bees in early spring. Should a few fine days accompany their flowering, many poor hives will be enabled to ward off the impending famine, which but too often then threatens them. From about the 20th to the 30th of March, 1830, the weather was so favourable as to enable the bees to make an extraordinary collection. Single hives, in some days, gained in weight upwards of 3lbs. each, and worked in wax, where room was given, as vigorously as at Midsummer. When we consider the small number of bees, at this early season, so large a collection is quite astonishing. The spring of 1841 was a very similar one. On the 16th March, my hives gained in weight from 2lbs. to 3lbs. each, during the day! I saw drones out on the 15th April, and knew of swarms on the 29th of that month!!

The Honey Dew, particularly that deposited by the *aphides* (plant lice) is in some seasons a fruitful source of honey. That found upon the leaf of the oak appears to be the most productive to the bees.

#### ARTIFICIAL SWARMING.

Those who have studied the simple principle

as already explained, upon which the rearing of artificial queens is conducted, are prepared to understand how artificial swarming is accomplished. Taking into consideration the time required to accomplish it, and this after a natural swarm is no longer to be expected, together with the fickleness of our climate, and consequent uncertainty of sufficient supplies being collected to maintain the family,—it is not likely that the practice will become a favourite one. However, occasions may arise, in which it may be desirable to increase the number of stocks by such means. As already inferred, the practice is founded upon the power of raising a queen from an egg, or very young larva of a worker bee. The following is a simple mode of proceeding. (See “Honey Bee,” p. 157.) “Towards noon of a fine day, if the bees cluster out much, let the stock hive be removed to a distance, and a spare hive or box be put in its place, to one bar of which, is attached a comb, containing worker eggs, or very young larvæ, of the same sex (better still, if the hive or box contain also one or two other worker combs,) the outliers, or the bees that are abroad, or both, as the case may be, will then enter the new habitation, cluster round the brood, construct one or more royal cells, to inclose one or more eggs, in the manner already described, and raise a young sovereign; and thus, if the season be favourable, form a flourishing stock.”

The system may be varied, so as to oblige *the stock* to raise a young queen. Drive the bees of a stock as already directed. Put them into their destined hive, which, if furnished, or partly fur-

nished, with combs is all the better. This mode had better be accomplished in the forenoon, the driven bees carried a mile or more, the stock remaining in its place to take the outlying and returning bees. Apiarians living in the neighbourhood of productive heaths might manage thus, even rather late in the season. If too far off from the apiary, get some cottager to give the hives a standing in his garden. Transportation, which is largely practised in some parts, may be beneficially followed in other cases. It must be borne in mind, that in all systems of rearing artificial queens, and making artificial swarms, the hives must either contain drones, or there must be some drones in the immediate neighbourhood. My friend Mr. Humphrey proved that the young queen of a second swarm, which did not contain a drone, was nevertheless impregnated, but she did not begin to lay until a fortnight had elapsed after swarming.

#### MISCELLANEOUS OBSERVATIONS.

*Retarded Impregnation.*—If the impregnation of a queen be retarded beyond the 20th or 21st day of her life, a very extraordinary consequence ensues. She lays drone eggs exclusively, and this, indiscriminately, in worker cells, as well as in drone cells. During my apiarian experience I have had two decided instances of this curious fact. Huber was the first who noticed this effect.

Vigorous hives contain brood at almost all seasons of the year. I have more than once found it in January, and near the end of November, in a hive that I had lately been feeding.

Indeed, it appears that at any time when the temperature is not too low for the bees to appropriate the food given to them, that the queen will deposit eggs.

#### FRIENDLY INTERCOURSE.

Mr. Knight, the late scientific President of the London Horticultural Society, addressed a paper to the Royal Society on the occasional friendly visiting of bees. Having had instances of it myself, I will give the brief particulars of one, as extracted from my Journal:—

“A cottage hive, and No. 5, White's boxes, commenced a friendly intercourse on the 4th May, 1833. It was most rapid, beginning in the morning before other hives were stirring, and continuing in the evening until dusk. A continuous stream of bees was kept up between the two hives. This continued until the 12th. The bees were in great agitation; and the heat in the hives much greater than usual. What could have been the cause is unknown, and probably will remain so. Robbery, it could not be; for both hives increased in weight during the time, the cottage hive  $3\frac{1}{2}$  lbs., and White's  $5\frac{1}{2}$  lbs. The weather being fine, other hives had gained considerably more, not being hindered as these were. Both hives were internally right, as to their queens, &c.; the cottage hive swarming on the 2nd June, and White's continued to increase, breeding drones, and filling its spare box. There was no family connection between the two hives. Such are the facts, but I can come to no conclusion upon them. It is a strange trait in the history of bees, they having been considered to

have no intercourse with each other but such as was hostile and predatory."

#### UNUSUAL TIME FOR THE EXPULSION OF DRONES.

"At the end of May, 1834, my Huber hive expelled all its drones. I examined the hive closely, and found a few drone larvæ, but no queen cells formed. I concluded that swarming was not intended, and so it proved. It was a very dry spring." I may here observe, that dry springs are much less prolific in swarms, than moist ones.

#### INFLUENCE OF THE AGITATION ATTENDING SWARMING.

On a swarm coming off from a hive in my apiary, another swarm, hived the day before, and placed very near to it, left its hive and clustered close to the first. The only way in which I can account for this singular proceeding is, that the agitation consequent upon swarming was communicated from one hive to the other. The swarm, which joined the other, had a queen, and was going on well, for, on examination, I found she had already begun to deposit her eggs, in the combs with which the hive was furnished. I succeeded in hiving the swarms separately, and put back the one which followed the other into its former dwelling, where it remained. Now, in this instance, it is evident that the impulse was communicated from the bees to the queen, and not, as it is stated by Huber, from the latter to the former; nor am I quite satisfied as to this alledged influence in general cases. Another

contradictory instance may be given, in a swarm having a *dead* queen.

#### ATTACHMENT TO A DEAD QUEEN.

I had traced a queen bred in June, 1828 (which had an imperfect wing,) until May, 1832, when she died, being three years and eleven months old, the oldest, I believe, hitherto recorded. Having bred drones in April, 1832, and well stored the hive with workers, it appears that she shortly afterwards died, for in May following a large swarm left the storified colony, of which she was queen; and upon my noticing a cluster of bees upon the ground, I found upon examination that they had a dead queen amongst them. She had evidently been dead for some time, being much mutilated. The bees returned of themselves to the stock, and subsequently swarmed with young queens five times. . On two occasions they returned voluntarily, and on three others I took a queen from them. Now, it would appear that on the approaching maturation of the royal brood—(for piping was heard on the next day after the issue of the first swarm, and a second swarm came off on the *third day*,)—that the bees, determining upon swarming before the royal brood came forth, actually brought the dead body of their old queen out with them! A precisely similar instance of attachment to a dead queen ant, is given in Gould's "Account of English Ants," London, 1747, in which, at p. 25, after giving an account of some proceedings in a colony of black ants, he says—"By some misfortune, she (the queen) died; the ants, as if not apprised of her death, continued their

obedience. They even removed her from one part of the box (in which he was making his observations) to another, and treated her with the same court and formality as if she had been alive. This lasted two months, at the end of which, the cover being open, they forsook the box, *and carried her off.*" I will here observe that those naturalists, who are so fortunate as to meet with one of the few remaining copies of this very interesting little work, will not only find themselves amply repaid by its perusal, but that it contains much matter, which may (on going over other authors) have been considered of subsequent acquirement.

#### CHANGE OF STOCK.

Though I can give no satisfactory reasons for the fact, yet it certainly is one, that bees brought from a distance very generally thrive better than families long domiciled on the spot. I am borne out in this opinion, by the concurrent testimony of my apiarian friends. Whether they ply more vigorously on finding themselves in a strange situation, or what can be the reason, I leave others to guess at.

#### FORTIFICATION.

Huber having noticed that bees occasionally construct barricadoes, to exclude an enemy, apparently the Death's-head hawk moth, has been much ridiculed—particularly by Huish—for the assertion. I confess to participating in this incredulity. However, that they do occasionally erect defences, I have had a convincing proof. A kind of curtain, apparently a compound of

wax and propolis, and about the 16th of an inch in thickness, was once erected before the entrance of one of my hives—one of the long, upright Polish ones. The entrance was about  $2\frac{1}{2}$  inches in length, and half an inch in height. This was wholly closed up, with the exception of a small aperture at each end. It was erected at the end of the summer of 1837, which year did not abound with wasps, the chief enemy of bees in this country; so that what danger it was meant to guard against is unknown. A representation of it is given in "the Honey Bee," p. 379.

#### STINGING.

"An effectual remedy appears to be *aq. ammon.* or spirit of hartshorn: nor is this surprising, when we consider that the venom of the bee, or wasp, is evidently acid." See "Honey Bee," p. 328. Mr. Taylor informs me that he has found *liquor potassæ* never to fail. "It should be used in small quantity on the point of a needle or fine nibbed pen, introduced into the wound." All remedies should be applied as quickly as possible.

#### THE APIARY.

Although in a well-sheltered situation the aspect is probably of but little consequence, yet where exposed to cold north and east winds much injury is sustained. The hives should front on some point, from east, round south, to west.

Where the hives are placed upon single stools, there is no better covering than the common straw one—or "hackle." This is warm in winter and cool in summer. Always avoid such sub-



stances as are retentive of heat, such as milk-pans, slates, &c. Those apiarians, who step at all out of the beaten track, should, however, provide themselves either with a shed or enclosed apiary. The former may be a frame standing upon legs about two feet from the ground. This frame should be about two feet wide and boarded, for the hives to stand upon on their moveable floors. The front, through which are the entrances to the hives, should be four feet in height above the floor. The roof should pitch towards the front, and the whole closed at the back by folding doors. The front and ends which are firmly let into the bottom frame, may be boarded, or covered in any way which meets the taste of the maker. The entrances should be so arranged as to leave nine inches clear between the hives at the least. Entrance blocks should be provided, through which the bees have a passage out. These are intended to fill up the space between the hives, and the front of the shed; say, a block of deal five inches in length and one or more in thickness, its width sufficient to keep the hive clear of the shed. Through this, cut an entrance three inches long and  $\frac{3}{8}$ ths of an inch high. A perforated slide runs through an aperture, cut to receive it, in the right hand end of the block, and closes the entrance, or partly so, according to the object to be attained; whether it be to confine the bees—a practice seldom to be resorted to, or to contract the entrance so as to enable the inmates better to defend themselves against wasps or robber bees.

An enclosed apiary—a small room—for the accommodation of the more scientific apiarian,

will be found a great convenience. What has been said of the shed will enable him to adapt this for the object in view. Range the hives round the room upon a shelf near two feet from the floor. Adjust entrance blocks according to the requirements of the different shaped hives, so as to conduct the bees through the wall, which in all cases must be carefully fitted that the bees do not get into the house, with which they have nothing to do. Give ample light by windows at each end, which should hang upon centre pivots, so that the whole can be thrown into open space, and the experimental apiarian will have a little sanctum where he may at all times, operate free—if rightly managed—from annoyances of every kind. Of course these erections may be made to show an architectural character, according to the taste of the proprietor.

#### CLEANLINESS.

An occasional cleansing of the floors, particularly early in the spring, is of great importance. When bees are afflicted with dysentery, let this be carefully attended to. I will here observe that a gift of a little of the prepared syrup will probably prove beneficial in such cases. The entrances to the hives should frequently be examined during the winter, as I have known instances in which the whole family had been destroyed through the fallen bees forming a damp mass at the entrance, and excluding the air.

#### MANIPULATION OF HONEY AND WAX.

After deprivation, the combs should be kept in a warm room, till they are drained. The sooner

this is done the better will the honey drain from them. The waxen covers, on both sides of the sealed combs, should be sliced off, when, by inverting them on a hair sieve, the greater part of the honey will run away. What remains, together with the dark and more refuse combs, may be chopped up, and put to drain in a sieve or jelly bag. The whole of the broken combs may, after draining, be put into as much water as will float them, and remain in it for a day. The water, when strained, may be used for making common mead, or boiled down with ale and sugar to make syrup for the bees.

#### MEAD.

The following are Dr. Bevan's directions for making mead:—"Dissolve an ounce of cream of tartar in five gallons of boiling water; pour the solution off clear upon twenty pounds of fine honey, boil them together, and remove the scum as it rises. Towards the end of the boiling add an ounce of fine hops; about ten minutes afterwards put the liquor into a tub to cool; when reduced to the temperature of 70deg. or 80deg. of Fahrenheit, according to the season, add a slice of bread toasted and smeared over with a very little yeast. The liquor should now stand in a warm room, and be stirred occasionally. As soon as it begins to carry a head it should be tunned, and the cask filled up from time to time from the reserve, till the fermentation has nearly subsided, It should now be bunged down, leaving a small peg-hole; in a few days this may also be closed, and in about twelve months the wine will be fit to bottle."

With regard to the combs, my advice is to put them into a canvas bag, and keep this down in a vessel of boiling water. The wax will soon dissolve, and with a little pressure will percolate through the bag, leaving all the refuse in it. It may then be skimmed off into a tub containing a pretty large quantity of cold water, in which it will at once solidify and swim upon the top. When separated from the water, the wax should be again melted with just water enough to prevent burning. Brass vessels are excellent for this purpose. Rinse the basins or moulds with cold water, and pour the wax into them. Cover it over, and place it by the fire-side to cool slowly, in order to prevent its cracking. Some impurities will be found at the bottom of the cake; these must be scraped off and the wax re-melted. These meltings should be conducted over a very slow fire, such as wood embers, or the wax will suffer materially in colour, fragrance, and tenacity.

#### CONCLUDING REMARKS.

Necessarily restricted, in a work like the present, to very narrow limits, I have, in order to give the more important points, been compelled to omit, or greatly abridge, many interesting observations and details; and to this, I trust, will be attributed any omissions which may be detected. I beg my apiarian brethren to believe that I am no blind partisan of any particular system, having given, as has been seen, a fair trial to most; and if, in what has been written, they may discover a leaning to any system, they will have the candour to interpret it as the approbation suggested by my experience.

However, my general instructions for the management of the bees are alike applicable to any system of hive, and let my readers repel the quackery, which would have them believe that it was the *kind of hive* which commanded the "honed store." No. That will be ruled by the productiveness of the season and locality in which it is placed, and these vary greatly. One thing I must strongly urge—the importance of bars, or some equivalent arrangement. Be the general system adopted what it may—single hiving—collateral hiving—or storifying; there surely can be little occasion for me to enlarge upon the advantages of being at all times able to extract, and, if need be, return uninjured, every individual comb. To say nothing of the pleasure and facility which is thus afforded to the scientific apiarian, it will give even to those who look only to the produce of their hives, the means of appropriating it in the easiest and best manner; particularly when, as should always be the case, their object is only to share with their little gatherers—to become "sleeping partners" in the firm—to take only their share of the surplus, when all other wants have been provided for.

Persons requiring further information upon the interesting subject of bee-keeping, will find much pleasure and information in Dr. Bevan's elaborate work, "The Honey Bee;" in Huber's "New Observations on the Natural History of Bees;" in Mr. Cotton's prettily illustrated work, "My Bee Book;" and in the works of Nutt, Bagster, Taylor, Wighton, and Payne. Huish's Treatise is valuable as a compilation. I would not wil-

lingly omit the name of any of my contemporaries, for all have contributed something worth knowing to the fund of apiarian knowledge. Persons taking pleasure in the perusal of apiarian lore, will also find much instruction and amusement in the works of Butler, Purchas, Warder, White, Thorley, Mills, Wildman, Keys, Bonner, &c., when these old works can be picked up. The *Gardeners' Chronicle* has lent its columns to the diffusion of considerable apiarian information, and however evident it is, that to the majority of its correspondents much information is necessary, yet the fact that a means is thus given, for the interchange of opinion, and the acquisition of knowledge, which is frequently taken advantage of—is a pleasing proof that there exists a strong wish to acquire information on the subject.

Indeed, in addition to a rather lengthened experience of my own, the stores of information collected by others are so large, that I could well have written a much bulkier work. My aim, however, has been, as before observed, so to condense my materials as to bring the price of the work within the means of all, and (as at such a price, profit to myself is out of the question,) I am induced to hope that the more affluent will extend the information and usefulness it is intended to convey, by distributing to their poorer neighbours—"THE SHILLING BEE BOOK."

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Those parties who are in anticipation of requiring hives in any succeeding season, are particularly requested to give their orders early in the previous winter.

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